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## Inside This Issue

### STATE-OF-THE-ART PAPER

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##### Teamwork and Leadership in CPR

2381

*Sabina Hunziker, Anna C. Johansson, Franziska Tschann, Norbert K. Semmer, Laura Rock, Michael D. Howell, Stephan Marsch*

Despite substantial efforts to utilize cardiopulmonary resuscitation (CPR) algorithms, the outcomes of CPR remain disappointing. Emerging evidence suggests that in addition to the technical skills of individual rescuers, human factors such as teamwork and leadership affect the efficacy of CPR. This review by Hunziker and colleagues describes research linking team interactions to the performance of CPR. Most of this research comes from simulator studies, which remove the clinical variables of the resuscitation, thus letting researchers study human factors and team interactions. Teamwork and leadership training appear to improve team performance and have recently been included in guidelines for advanced life support courses.

### CLINICAL RESEARCH

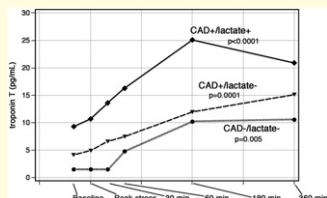
#### INTERVENTIONAL CARDIOLOGY

##### SYNTAX Score Provides Prognostic Information in Patients With Acute Coronary Syndromes

2389

*Tullio Palmerini, Philippe Genereux, Adriano Caixeta, Ecaterina Cristea, Alexandra Lansky, Roxana Mehran, George Dangas, Dana Lazar, Raquel Sanchez, Martin Faby, Ke Xu, Gregg W. Stone*

Palmerini and colleagues investigated the predictive value of the SYNTAX score (SS) for risk stratification in patients with non-ST-segment elevation acute coronary syndromes (NSTEMACS) who undergo percutaneous coronary intervention (PCI). Subjects were stratified into tertiles of SS based on the original angiogram. By multivariable analysis, SS was an independent predictor of 1-year death, cardiac death, myocardial infarction (MI), and target vessel revascularization. SS impacted death, cardiac death, and MI both within the first 30 days after PCI and between 30 days and 1 year. In patients with NSTEMACS undergoing PCI, the SS provides robust prognostic information.



## BIOMARKERS

**Troponin T May Be Released With Ischemia, Rather Than Only With Myonecrosis 2398**

Aslan T. Turer, Tayo A. Addo, Justin L. Martin, Marc S. Sabatine, Gregory D. Lewis, Robert E. Gerszten, Ellen C. Keeley, Joaquin E. Cigarroa, Richard A. Lange, L. David Hillis, James A. de Lemos

Turer and colleagues studied whether ischemia without necrosis would result in the release of cardiac troponin T (cTnT). Patients were referred for diagnostic catheterization and rapid atrial pacing with serial measurements of cTnT from the coronary sinus and peripheral blood. cTnT concentrations were found to increase with pacing. Although peripheral cTnT concentrations tended to be higher for patients with atherosclerosis and lactate elution, the relative and absolute changes were similar for those with and without atherosclerosis. The higher sensitivity of current-generation cTnT assays can detect ischemia, without frank infarction, even among patients without atherosclerosis.

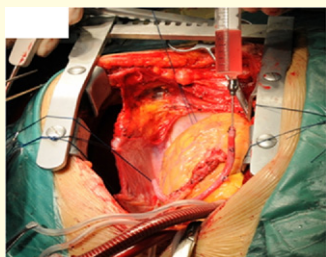
*Editorial Comment: Harvey D. White, p. 2406*

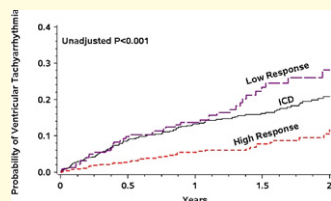
## HEART FAILURE

**Bone Marrow Mononuclear Cells Delivered Through Graft Vessel During CABG May Improve Outcomes 2409**

Shengshou Hu, Sheng Liu, Zhe Zheng, Xin Yuan, Libuan Li, Minjie Lu, Rui Shen, Fujian Duan, Xiaoling Zhang, Jun Li, Xuewen Liu, Yunbu Song, Wei Wang, Shibua Zhao, Zuoxiang He, Hao Zhang, Keming Yang, Wei Feng, Xin Wang

Bone marrow mononuclear cells (BMMNCs) are easy to harvest and have the potential to improve heart function by inducing angiogenesis and myocardial regeneration. Hu and colleagues hypothesized that delivering the cells into the vasculature during cardiac arrest would improve their uptake and dispersal compared with direct intramyocardial injection. Patients with ischemic cardiomyopathy undergoing coronary artery bypass grafting (CABG) were randomized to autologous BMMNC infusion through the newly made bypass graft or placebo. At 6 months, there were significant improvements in left ventricular ejection fraction, left ventricular end-systolic volume index, wall motion score index, and 6-min walking distance in patients assigned to BMMNC.





## CARDIAC RESYNCHRONIZATION THERAPY

**Reverse Remodeling Reduces the Risk of Ventricular Tachyarrhythmias in CRT Patients**

2416

*Alon Barsheshet, Paul J. Wang, Arthur J. Moss, Scott D. Solomon, Amin Al-Abmad, Scott McNitt, Elyse Foster, David T. Huang, Helmut U. Klein, Wojciech Zareba, Michael Eldar, Ilan Goldenberg*

Barsheshet and colleagues evaluated the relationship between echocardiographic response to cardiac resynchronization therapy (CRT) and the risk of ventricular tachyarrhythmias (VTA). The rates of VTA were compared between those who had echocardiographic remodeling, defined as a  $\geq 25\%$  reduction in left ventricular end-systolic volume at 1 year, to those who had no response, and to those who received an implantable cardioverter-defibrillator (ICD) only in the MADIT-CRT (Multicenter Automatic Defibrillator Implantation Trial–Cardiac Resynchronization Therapy). The risk of VTA was lowest in echocardiographic responders (12%) followed by ICD-only patients (21%), and was highest among nonresponders (28%). These findings suggest that the process of reverse remodeling induced by CRT results in both mechanical and electrical stability of the left ventricle.

*Editorial Comment: Anne B. Curtis, p. 2424*

## CARDIAC IMAGING

**Meta-Analysis of the Long-Term Prognostic Value of Coronary CT Angiography**

2426

*Fabian Bamberg, Wieland H. Sommer, Verena Hoffmann, Stephan Achenbach, Konstantin Nikolaou, David Conen, Maximilian F. Reiser, Udo Hoffmann, Christoph R. Becker*

Bamberg and colleagues conducted a systematic review and meta-analysis to determine the predictive value of coronary computed tomography (CT) angiography for subsequent cardiovascular events. A total of 11 eligible papers, including 7,335 participants, were combined. The presence of  $\geq 1$  significant stenosis was associated with a 10-fold higher risk of subsequent events including revascularization and a 6-fold higher risk of events excluding revascularization. Further analysis revealed that the following findings influenced the likelihood of subsequent events: 1) the presence of at least 1 coronary artery stenosis  $\geq 50\%$  diameter; 2) the number of coronary segments with a stenosis  $\geq 50\%$ ; 3) left main disease; 4) the presence of any detectable atherosclerotic plaque, regardless of severity; and 5) the number of segments containing any nonobstructive plaque, calcified, noncalcified, and mixed plaque.

## CONGENITAL HEART DISEASE

## Late Status of Fontan Patients: Effects of Surgical Fenestration

2437

*Andrew M. Atz, Thomas G. Travison, Brian W. McCrindle, Lynn Mahony, Michael Quartermain, Richard V. Williams, Roger E. Breitbart, Minmin Lu, Elizabeth Radojewski, Renee Margossian, Wesley Covitz, Welton M. Gersony, for the Pediatric Heart Network Investigators*

Creation of a systemic to pulmonary venous atrial level communication (fenestration) at the time of a Fontan procedure may improve acute hemodynamics, but the long-term outcomes have not been well described. Fenestration was performed in two-thirds of patients reviewed by Atz and colleagues. After multivariable adjustment, the fenestrated group had a shorter length of hospital stay. At a median of 8 years after Fontan, the fenestration remained open in 19% of subjects, with 59% of those closed by catheter intervention and 40% with apparent spontaneous closure. Functional health status, exercise performance, echocardiographic variables, and risk of stroke or thrombosis did not differ in those with an open or closed fenestration. These results confirm the early benefits of surgical fenestration and its long-term safety.

## PRE-CLINICAL RESEARCH

## PRE-CLINICAL RESEARCH

## Gene Transfer and Progenitor Cell Mobilization Improve Post-MI Recovery in a Mouse Model

2444

*Jérôme Roncalli, Marie-Ange Renault, Jörn Tongers, Sol Misener, Tina Thorne, Christine Kamide, Kentaro Jujo, Toshikazu Tanaka, Masaaki Ii, Ekaterina Klyachko, Douglas W. Losordo*

Sonic hedgehog (Shh) gene transfer improves myocardial recovery by up-regulating angiogenic genes and enhancing the incorporation of bone-marrow-derived progenitor cells (BMPCs) in infarcted myocardium. In this report, Roncalli and colleagues investigated whether the effectiveness of Shh gene therapy could be improved by inducing progenitor cell mobilization from the bone marrow with AMD3100 in a mouse model. Mice were treated with Shh, AMD3100, or both. Combination therapy enhanced cardiac functional recovery (i.e., left ventricular ejection fraction) and was associated with less fibrosis, greater capillary density, and enhanced BMPC incorporation.

